

Volition completes the puzzle: Development and evaluation of an integrative trait model of self-regulated learning

Laura Dörrenbächer¹, Franziska Perels

Department of Educational Sciences, Saarland University

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Abstract

Most self-regulated learning theories are imbedded within a social-cognitive framework and comprise cognitive, metacognitive and motivational components. Nevertheless, these theories partly neglect volition, which is necessary for implementing learning intentions. Therefore, the present study is frontline as it aimed to integrate volition within a comprehensive trait model of self-regulated learning (SRL) while proposing a new conception of trait volition for learning. A sample of $n = 377$ college students (70.1% female, $M_{Age} = 23.36$, $SD_{Age} = 4.12$) filled out questionnaires concerning volitional, cognitive, metacognitive, and motivational belief aspects of SRL. The results of confirmatory factor analysis speak in favour of integrating the highly interrelated constructs of procrastination, future time perspective, and academic delay of gratification in order to depict volition for SRL. Moreover, the structural equation modelling results favour a twofold motivational component for SRL that comprises both motivational beliefs and volition instead of including volition as a separate component aside from cognitive, metacognitive and motivational belief components. Additionally, the comprehensive trait model of SRL is related to GPA, which is a first indication of its validity. Therefore, the study empirically investigates a new conception of trait volition for learning environments as well as its integration within a comprehensive SRL framework. Future research should consider the importance of volitional components for SRL and could investigate individual differences concerning the modelled components.

Keywords: self-regulated learning; volition; academic delay of gratification; procrastination; future time perspective

¹ Corresponding author: Laura Dörrenbächer, Department of Educational Sciences, Saarland University, Campus Building A 4 2, 66123 Saarbrücken, Germany. Phone: +49(0)681 / 30258337, Fax: +49(0)681/ 30258341, Email: laura.doerrenbaecher@uni-saarland.de DOI: <http://dx.doi.org/10.14786/flr.v3i4.179>



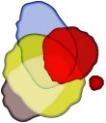
1. Introduction

Although there are many different models to explain self-regulated learning (hereinafter referred to as SRL), they all characterize the learner as an individual that is self-determined and that actively creates his or her learning process (Efklides, 2011). A self-regulated learner therefore has the ability to set goals and to accomplish these goals by monitoring, controlling, and altering his or her behaviour, motivation and cognition adaptively as a response to changing environmental factors (Pintrich, 2000; Zimmerman, 2000). Consistently, most authors agree that SRL embraces cognitive, metacognitive as well as motivational components that interact reciprocally (Boekaerts, 1999). Recent research has shown that SRL positively influences academic outcomes in different areas of education (e.g. Dignath, Büttner, & Langfeldt, 2008; Kitsantas, Winsler, & Huie, 2008) and that college students show better performance when self-regulative strategies are used (Nandagopal & Ericsson, 2012). Concerning its conceptual status, SRL can be seen as a trait that influences individual learning processes on a general level (e.g. Boekaerts, 1999) or as a dynamic state that changes cyclically according to situational demands (e.g. Schmitz & Wiese, 2006). Recently, there have also been models proposed that integrate both conceptual dimensions (e.g. Efklides, 2011) because SRL can be regarded as an aptitude and an event (Winne & Perry, 2000). Matthews, Schwean, Campbell, Saklofske, and Mohamed (2000) concordantly argue that SRL has nomothetic (trait) as well as idiographic (state) qualities. As states are influenced by corresponding traits (Hong, 1995) and traits help to explain individual differences (Hong & O'Neil, 2001), the present study aims to develop and evaluate an integrative trait model of SRL that could be useful for future research. The trait model of Hong & O'Neil (2001) is used as a basis as it already has been tested empirically. We investigate an extended model that also includes a cognitive component (Boekaerts, 1999) and considers several subcomponents of metacognition and motivation that are important for depicting SRL comprehensively.

Even though the definition of self-regulated students as "metacognitively, motivationally, and behaviourally active participants in their own learning process" (Zimmerman, 2008, p. 167) takes into account volitional aspects, SRL research largely has underemphasized such abilities that can predict academic achievement as well (Duckworth, Gendler, & Gross, 2014). Volition is the capability to inhibit distracting behaviours in order to attain a higher goal (Duckworth & Seligman, 2006) and helps to protect learning intentions from action tendencies competing with that goal (Corno, 2001). As it has been mostly described within action-control theory (Heckhausen & Kuhl, 1985), several authors demand for adding volitional aspects above and beyond motivational, cognitive, and metacognitive components within a social-cognitive framework when modelling SRL (Wolters & Benzon, 2013; Zimmerman, 2011). Therefore, the present study examines the conceptual structure of volition comparing two integrative trait models of SRL (see figure 1): One model treats volition as a separate component of SRL besides cognitive, metacognitive and motivational belief components (Corno, 2001), while the second model categorizes it as a motivational subcomponent besides motivational beliefs² (Zimmerman, 2008). In order to validate the models, their relation to GPA of university entrance diploma will be analysed using structural equation modelling. In the context of integrating volition into the SRL framework, a new conceptualization of trait volition is presented: We chose procrastination, future time perspective, and academic delay of gratification as these constructs represent three volitional traits that are highly interrelated (e.g. Bembenutty & Karabenick, 2004; Sirois, 2014) and that act as important supporters for SRL (e.g. Park & Sperling, 2012; Zimmerman, 2011).

Altogether, the present study adds to research because it evaluates an extended trait model of SRL that takes into account cognitive and metacognitive components as well as motivational beliefs and volition while the position of volition within the SRL framework is examined. In this context, a new conceptualization of volition for learning environments is developed and tested. The present study is frontline as it brings together two highly relevant theoretical frameworks for the field of educational psychology whose relation has been neglected for a long time. After presenting the basis for our

² The term motivation will be used to refer to motivational components in general, while motivation beliefs refer to self-beliefs concerning self-efficacy, goal orientation or intrinsic task value and are distinguished from volition as a second motivational component.



comprehensive SRL trait model, we will describe the research lines of SRL and volition in order to point out differences between them. In a next step, we present attempts to integrate both frameworks and depict the conceptualization of trait volition for SRL.

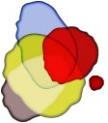
1.1 Trait-conception of SRL

Traits represent relatively stable characteristics that influence and predict performance across a wide range of tasks (Hertzog & Nesselroade, 2003). Thus, trait SRL can be described as a general disposition of students and learners in general (Boekaerts & Corno, 2005) or as relatively stable tendencies to use SRL strategies. Individuals therefore will respond relatively consistently to a range of different learning situations: Learners with high SRL trait values should show more metacognitive skills and be more self-efficacious than should individuals with low values on this trait (Hong & O'Neil, 2001). The fact that SRL is related to other personality traits and achievement motives also speaks in favour of the trait perspective (Wolters & Hussain, 2014).

Although the concept of state SRL has recently gained importance in literature and stimulated a great deal of research (Azevedo, 2014), the examination of trait SRL is necessary to understand individual differences in SRL and achievement. Accordingly, several studies have shown the positive influence of SRL on academic outcomes in all areas of education (e.g. Dignath, Büttner, & Langfeldt, 2008; Kitsantas, Winsler, & Huie, 2008) and therefore constitute its relevance and its meaning for lifelong learning (Bronson, 2000). In line with this, college students show better test performance when self-regulative strategies are used during test preparation and accomplishment (Kitsantas, 2002), and their grade point average (GPA) level differs depending on the use of self-regulative learning strategies (Nandagopal & Ericsson, 2012). Moreover, the examination of SRL as a trait can help to explain differential effects of intervention programs (Hong & O'Neil, 2001). Therefore, it can have practical implications for dealing with heterogeneity in learning and in fostering learning competences.

The trait SRL model of Hong & O'Neil (2001) can be used as a starting point for the development of an integrative model. They conceptualize SRL as a third-order factor that subsumes the two second-order factors metacognition and motivation, which are highly relevant components of SRL and which most models have in common (Efklides, 2011). The metacognitive factor comprises the subcomponents of planning one's time and strategy use as well as the construct of self-checking, which is a method to control proceedings and adapt learning behaviour in a goal-oriented way. The conceptualization of the motivational factor, which is represented by effort as well as self-efficacy, indicates a combination of two motivational concepts: Whereas self-efficacy refers to more or less unconscious beliefs or attitudes about one's skills and competences (Bandura, 1997), effort comprises processes that include deliberate thoughts or behaviours in order to reach a goal (Carver & Scheier, 2000). Therefore, self-efficacy as a motivational belief mostly influences goal-setting processes, whereas effort is important for the initiation and implementation of an action (Corno, 2001). Effort therefore can be considered as a volitional component of SRL, helping students to focus attention and to deal with distractions of personal and environmental origin (Zimmerman, 2011). Even though volition can have the role of a mediator between learning intentions and the actual use of learning strategies, models of SRL mostly have overlooked volitional components (Garcia, McCann, Turner, & Roska, 1998).

Although the previously described model (Hong & O'Neil, 2001) integrates various important components of SRL, it has several points of criticism: At first, the motivational belief component is only represented by self-efficacy, although goal orientations, intrinsic motivation, or causal attributions are also crucial motivational properties (Zimmerman, 2008). Moreover, it simplifies the volitional component by reducing it to effort and therefore neglects other important volitional factors. Additionally, the model lacks the integration of a second-order cognitive factor or the use of cognitive learning strategies that represent a further important SRL component (e.g. organization, critical thinking; Pintrich, 2000). As the metacognitive factor comprises the construct of self-checking, it blends the capabilities of self-recording as an



observational method and self-evaluation as a judgment of one's own actions although these are located in different phases of a self-regulated learning cycle (Zimmerman, 2000). Concluding, Hong and O'Neil's model (2001) is a first attempt to integrate several important components of SRL and to test this structure empirically but has several shortcomings. Motivated by the abovementioned points of criticism, the present study adds to research as a cognitive factor is included, the metacognitive and motivational belief factors are extended by adding several subcomponents and the structural position of the volition factor is examined in more detail. Therefore, the next sections aim to theoretically integrate trait volition within a broader framework of SRL considering the previously described shortcomings and to propose an extended concept of trait volition with regard to SRL. As far as we know, this study is the first to bring together these research lines and to test such an integrative SRL trait model empirically.

1.2 Integration of volition into SRL

1.2.1 Linking two frameworks

Self-regulated learning is described as the ability to set goals that are accomplished by monitoring, controlling, and altering one's behaviour, motivation and cognition in response to environmental conditions that are continuously changing (Zimmerman, 2000). This interaction of personal, behavioural and environmental processes reflects a social-cognitive perspective for describing learning processes (Bandura, 1986). Feedback loops between personal and environmental factors are assumed and represent their interdependence. Accordingly, Zimmerman's process model of self-regulated learning (2000) distinguishes between forethought, performance and self-reflection phases that comprise these interacting factors. The learner adapts his or her thoughts, affects and behaviour cyclically in order to attain a previous set goal. The social-cognitive framework therefore underlines the role of the learner's context and situation when goals are set as well as of previous performance when expectations are formed (Zimmerman & Schunk, 2001).

Volition is defined as the capability to inhibit irrelevant behaviours in order to attain a higher goal (Duckworth & Seligman, 2006). Concerning learning environments, volition helps to protect learning intentions in the presence of competing action tendencies or obstacles (Corno, 2001) by the use of action-control strategies (Kuhl, 2000). Therefore, volition is of importance when students have to maintain their concentration and effort in the presence of internal or external distractions because it supports tenacity (Zimmerman, 2011). The construct has mostly been described within action-control theory (Kuhl, 1984), where it is seen as a mediator between the intention to learn and the actual use of learning strategies (Corno, 1993). Concerning this framework, goal-directed activities can be divided into two distinct phases (Heckhausen & Kuhl, 1985): The pre-decisional phase comprises motivational processes that entail the choice of a specific goal as well as the appraisal of the goal's value and intention formation. The subsequent post-decisional phase involves the implementation of goal-directed behaviours by the use of volitional strategies that help to maintain one's intentions (Corno, 2001; Garcia et al., 1998). In this context, the framework describes how motivation and volition are interwoven and hints at the assumption that volition is a part of a broader motivational concept: Choice motivation influences goal setting and expectancy-value processes in the pre-decisional phase and therefore represents motivational beliefs like self-efficacy, task value and goal orientations (Husman, McCann & Crowson, 2000). Executive motivation however takes place in the post-decisional phase and affects action implementation and effort maintenance. According to Gollwitzer (1996), choice motivation is characterized by a motivational mindset, whereas a volitional mindset comes along with executive motivation.

As most SRL theories are imbedded within a social-cognitive framework (Zimmerman, 2000), motivational beliefs within the predecisional phase (e.g. self-efficacy, goal orientation) have been of particular interest for this line of research. Concerning the postdecisional phase of learning processes, SRL models focus on the application of cognitive learning strategies and therefore partly neglect volitional strategies necessary to implement one's intentions (Garcia et al., 1998). As Garcia et al. (1998) put it, executive motivation has mostly been neglected within SRL frameworks and the majority of SRL models



propose that processes of choice motivation “complete the puzzle” (p. 396). Hence, there is a lack of studies that investigate the relation of volition to SRL. Accordingly, several authors speak in favour of integrating volition within models of SRL (e.g. Duckworth et al.; 2014, Zimmerman, 2008) in addition to aspects of cognition, metacognition, and motivation. Concordantly, Corno (2001) argues that volition complements motivation and that both concepts taken together represent an action disposition. Nevertheless, action-control theory assumes a relatively absolute distinction between both concepts as choice motivation is terminated when the pre-actional phase and volitional processes start (Heckhausen & Kuhl, 1985). A social-cognitive view would be more dynamic, assuming an interaction between choice and executive motivational processes (Wolters, 2003b) and would question if volition is separable from traditional motivational measures like goal expectations (Zimmerman & Schunk, 2001). Therefore, a cross-fertilization of the conceptions could be beneficial for both social-cognitive and action-control theory (Duckworth et al., 2014). The abovementioned twofold conception of motivation (self-efficacy and effort) in Hong and O’Neil’s model (2001) is a first attempt to accommodate for this demand. Moreover, a recent study found that the construct of self-discipline, which is an expression of executive motivation and therefore stems from action-control theory, and SRL, which is a social-cognitive construct, were highly interrelated (Zimmerman & Kitsantas, 2014). Nevertheless, SRL had a significantly higher predictive validity for GPA than did self-discipline, and a two-factor model solution provided better fit indices in this study sample.

One attempt to integrate motivation and volition within a social-cognitive framework came from Corno and Kanfer (1993) who developed a model that illustrates the role of volition in the context of learning and motivation. Besides intrinsic and extrinsic motivation, volitional styles, action control and goal-related cognitions are integrated within the model. Nevertheless, this model has, as far as we know, not been empirically tested yet and it neglects metacognitive components which represent a key factor of self-regulated learning. Moreover, by integrating a strict distinction between decision-making and action implementation, the model is relatively rigid and neglects possible interactions between the two components. Another research line accounting for volitional aspects of learning that is imbedded within the social-cognitive framework of SRL focuses on the regulation of motivation and speaks in favour of subsuming motivational beliefs and volition under the broader term of motivation. The construct of motivation regulation is volitional in nature and comprises actions that support the purposeful initiation and maintenance of goal-directed behaviour (Wolters, 2003b). Therefore, it is a critical aspect of SRL that must coalesce with motivational beliefs and metacognitive processes to ensure success when learning. This importance speaks in favour of integrating it into the broader system of SRL (Wolters, 1999, 2003b). Wolters and Benzon (2013) have argued that empirical work concerning the link between regulation of motivation and other dimensions of SRL has to be extended, and that it has to be examined how this relation could be modelled at a general level (Wolters, 2003b). Nevertheless, motivational regulation only affects one category of volitional control and therefore does not depict the whole volitional framework (Kuhl, 1985). Moreover, although volition seems to support the influence of motivational processes on cognitive effort (Garcia et al., 1998), Husman et al. (2000) argue that research has not yet examined the relationship of motivational processes and volition. Concluding, the existing literature speaks in favour of integrating volition within models of SRL. As volition has mostly been neglected in SRL research, we will present a new conceptualization of volition for SRL by integrating academic delay of gratification, future time perspective and procrastination.

1.2.2 An extended conceptualization of trait volition for SRL

As with SRL, volitional traits can be distinguished from volitional states: It is argued that the use of volitional strategies may be an indicator of a dispositional trait ability to reach goals by controlling distractions (Corno, 1994). Volitional styles represent dispositional tendencies that influence goal implementation and are relatively stable (Corno & Kanfer, 1993). Kuhl’s (1985) differentiation of action- vs. state-orientation is an example for treating volitional styles as a predisposition that influences action. Concordantly, Boekaerts and Corno (2005) designated those strategies as habits supporting an effective working style, suggesting a trait conception. In order to conceptualize a volitional trait in the framework of SRL, we integrate academic delay of gratification, procrastination, and future time perspective. These



constructs have been selected because they represent volition within learning environments (e.g. Steel, 2007), show a relatively high stability (e.g. Sirois, 2014), are considered as SRL features (e.g. Bembenutty & Karabenick, 2004), and are highly interrelated (e.g. Dewitte & Lens, 2000). Moreover, several authors have argued for their investigation within an SRL framework (Bembenutty & Karabenick, 2004).

Academic delay of gratification is defined as postponing proximate, impulse satisfying actions to sustain previously intended actions oriented towards a distant but apparently more valuable academic goal (Bembenutty, 2008), and is therefore volitional in nature (Bembenutty & Karabenick, 2004). Depending on the underlying theoretical model, academic delay of gratification can be seen as “a volitional strategy, a cognitive schema, a general disposition or a personal trait” (Pintrich, 1999, p. 346). Since it is mostly described as the ability to wait for temporarily distant rewards (Bembenutty, 2008), the construct is seen as a trait in the present study. Moreover, several studies speak in favour of the construct’s relevance for academic achievement (e.g. di Benedetto & Bembenutty, 2013). It has been shown that this trait is associated with the level of self-regulation as well as the use of SRL strategies, and can be embedded within a broader framework of SRL (Bembenutty, 2008, 2009; Bembenutty & Karabenick, 2004).

Contradictory to this construct, procrastination is defined as a deliberate delay of intended actions although this delay in all probability has negative effects on reaching an important goal (Steel, 2007). It is therefore the opposite of motivated and volitional behaviour (Keller, 2008), and demonstrates a lack of effort regulation (Rakes & Dunn, 2010) or a volitional breakdown (Sirois, 2014). Concerning its conceptual status, most authors conclude that procrastination results from a trait-like tendency in behaviour (Sirois, 2014), with high stability over a period of ten years (Steel, 2007). Procrastination is a highly relevant construct in academic learning settings because it is very common among students (Schouwenburg, 2004) and negatively related to academic achievement (Akinsola, Tella, & Tella, 2007). For the integration of procrastination within an SRL framework, it could be argued that the two concepts may be opposite ends on the same regulatory continuum (Dietz, Hofer, & Fries, 2007; Park & Sperling, 2012), and that the level of procrastination is negatively related to metacognitive strategies (Howell & Watson, 2007; Wolters, 2003a).

The concept of future time perspective is represented by a conceptualization of time that is directed to the future and entails future-oriented beliefs concerning specific life domains (Peetsma, Schuitema, & van der Veen, 2012). The construct supports volition because it has a positive influence on the maintenance of motivation (Dewitte & Lens, 2000) and intention implementation (de Bilde, Vansteenkiste, & Lens, 2011). It is therefore related to the concept of maintenance self-efficacy (Luszczynska & Sutton, 2006) that is important for persistence on tasks. Future time perspective moreover fosters an inner pressure to achieve goals and is therefore a form of volitional motivation. Although it can be seen as a cognitive-motivational concept, the perceived instrumentality of future goals causes a stronger effort in learning (Simons, Dewitte & Lens, 2004), why we consider future time perspective as volitional. Similar to academic delay of gratification and procrastination, it is conceptualized as a general predisposition that is stable over time (Peetsma et al., 2012; Zimbardo & Boyd, 1999). Students with this cognitive temporal bias tend to show better study outcomes (Horstmanshof & Zimitat, 2007) and are more conscientious (Zimbardo & Boyd, 1999). Several authors have stated that a time perspective directed towards the future has an important influence on motivational processes and the use of SRL strategies (de Bilde et al., 2011; Miller & Brickman, 2004; Zimmerman, 2011).

Several results speak in favour of a high interrelation of these constructs, and therefore support the hypothesis that they represent volition. A meta-analysis of 14 samples showed that students with a future time perspective displayed less procrastination (Sirois, 2014), and the fact that procrastinators are unable to postpone gratification expresses low levels of academic delay of gratification and low inhibitory control (Tuckman, 1991). Moreover, some authors have argued that future time perspective is responsible for the conceptual relationship of procrastination and academic delay of gratification (Dewitte & Lens, 2000) and that it is necessary to delay gratifications in academic settings (Bembenutty & Karabenick, 2004). Concluding, it seems reasonable to integrate these three constructs in order to depict volition within a SRL framework.



1.3 Purpose of the present study

As abovementioned, the present study aims to investigate several theoretical aspects concerning the conceptualization of volition within SRL: The overall aim is the development and evaluation of an integrative SRL trait model that takes into account the previously addressed shortcomings of the Hong and O'Neil model (2001). Besides the integration of a cognitive factor, the proposed model extends the metacognitive and motivational belief component and includes a volitional factor. Accompanying this extension, the comparison of two integrative SRL trait models should clarify the role of the volitional factor: One model integrates volition as a separate aspect distinct from cognition, metacognition and motivational beliefs (Corno, 2001), whereas the other one specifies the motivational component by integrating motivational beliefs and volition (Garcia et al., 1998; Wolters, 2003b; Zimmerman, 2008; see figure 1). Moreover, a new conception of trait volition for SRL that integrates academic delay of gratification, procrastination, and future time perspective is presented and evaluated. In order to validate the models, their relation to GPA of university entrance diploma will be analysed using structural equation modelling because SRL is associated with academic achievement (Dignath et al., 2008). Altogether, the present study adds to research by examining the structural relationship of academic delay of gratification, future time perspective and procrastination concertedly within an integrative trait model of SRL that encompasses cognitive, metacognitive, motivational belief as well as volitional components. It is frontline as it brings together two highly relevant educational concepts whose relation has been analysed rarely.

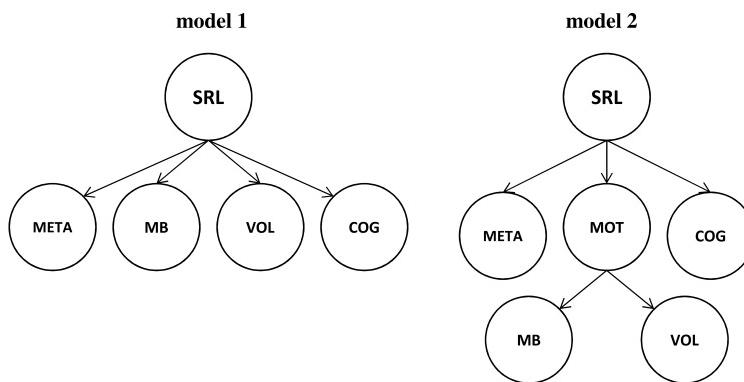


Figure 1. Two proposed integrative SRL models: Model 1 includes volition (VOL) as a factor besides cognition (COG), metacognition (META) and motivational beliefs (MB) while model 2 extends the motivational factor (MOT) by including volition besides motivational beliefs.

2. Method

2.1 Sample and sampling procedure

The sample comprised $N = 381$ undergraduate students from a southwestern German university. As four participants had missing data on all variables, they were excluded from the following analyses. Therefore, a total sample of $n = 377$ (70.1% female) with an age range from 17 to 45 years ($M = 23.36$, $SD = 4.12$) was analysed. The mean GPA of university entrance diploma was $M = 2.10$ ($SD = 0.60$, ranging from 1 = *excellent* to 4 = *poor*), indicating that there is no ceiling effect concerning the sample's academic achievement level. The students were enrolled in very different fields of study (pre-service teachers of



different subjects [65.0%], psychology [16.2%], languages and cultural studies [9.8%], natural sciences [2.9%], economics and law [2.4%], informatics [1.3%], other/not specified [2.2%]) and therefore reflected a large portion of available fields of study in Germany. The sample comprised students of all phases of their studies (year one: 25.0%, year two: 16.9%, year three: 25.7%, year four: 16.8%, year five or higher: 15.7%), while year of study was no predictor for SRL ($t(376) = -0.24, p = .81$). Testing was embedded into the first session of several university courses and students had the chance to win a shopping voucher. Participants had to sign an informed consent as participation was voluntary and data were anonymised by codes. At the beginning of the test session, every participant received an informed consent form that explained the purpose of the study and the use of the data gained. By signing the form, participants agreed to this procedure. The data collection was part of a larger project and was conducted with the lecturers' permission.

2.2 Instruments

2.2.1 Demographic information and academic performance

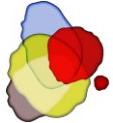
The first part of the questionnaire recorded demographic information such as gender, age, field of study, and GPA of university entrance diploma (ranging from 1 = *excellent* to 4 = *poor*). This university entrance diploma is the result of national school exams that are curricular-based and therefore comparable across different schools and regions. All university students pass this exam in the same class level ensuring a comparable educational level. As GPA of university entrance diploma is used for applicant selection at many universities and has a strong relationship with later university achievement (Wedler, Troche, & Rammsayer, 2008), it is very central in the German educational system. Moreover, it is comparable between students of all subjects of study which would not be the case for GPA of subject of study (Müller-Benedict & Tsarouha, 2011).

2.2.2 SRL inventory

In order to measure students' SRL trait, a questionnaire consisting of 32 items was developed. Questionnaires are appropriate to measure traits as they record generalized assessments concerning specific domains and abilities (Veenman, 2011). The items were adopted from existing inventories that measure SRL (e.g. Jerusalem & Schwarzer, 1981; Pintrich, Smith, Garcia, & McKeachie, 1991; Wild & Schiefele, 1994) or have been newly developed in order to optimize several subscales. The inventory measured cognitive, metacognitive, and motivational belief variables, and therefore represents the most popular categories of SRL traits (Boekaerts, 1999). The items were rated on a four-point Likert-type format, ranging from 1 (*I don't agree at all*) to 4 (*I totally agree*). Subscales with item examples, Cronbach's alphas, and number of items can be seen in Table 1. The factor structure of the three SRL components was tested using confirmatory factor analysis. The components (cognition, metacognition, motivational beliefs) each were modelled as latent second-order factors with their subscales as latent first-order factors and items as manifest variables. The results are acceptable for motivational beliefs [$\chi^2(50) = 128.61, p < .01, \chi^2/df = 2.57$, RMSEA = 0.065 [0.051 – 0.078], SRMR = 0.061, CFI = 0.934], metacognition [$\chi^2(71) = 194.74, p < .01, \chi^2/df = 2.74$, RMSEA = 0.068 [0.057 – 0.079], SRMR = 0.067, CFI = 0.934], and cognition [$\chi^2(8) = 22.31, p < .01, \chi^2/df = 2.79$, RMSEA = 0.069 [0.036 – 0.104], SRMR = 0.042, CFI = 0.949].

2.2.3 Volition inventory

As our study aimed to integrate three volitional traits (future time perspective, procrastination, and academic delay of gratification), a questionnaire comprising items of these three constructs was developed. The items stem from existing inventories to measure these constructs (Academic Delay of Gratification Scale, Bembenutty & Karabenick, 1998; Procrastination Scale, Tuckman, 1991; Future Scale of the Zimbardo Time Perspective Inventory, Zimbardo & Boyd, 1999). The items of future time perspective and procrastination were rated on a four-point Likert-type format, ranging from 1 (*I don't agree at all*) to 4 (*I totally agree*). The procrastination items register the presence of procrastinating behaviour and therefore



present a lack of volition. As the items of the academic delay of gratification scale consisted of two action alternatives, A and B, that represent the ends of a “delay of gratification-continuum”, these were rated on a four-point answer format, ranging from 1 (*definitely chose A*), 2 (*rather chose A*), 3 (*rather chose B*), and 4 (*definitely chose B*). B represents the alternative that reflects the highest ability to delay gratification and therefore the strongest volitional control. All items should be answered with regard to students’ learning behaviour. Subscales with item examples, Cronbach’s alphas and number of items can be seen in Table 1.



Table 1

Scales and subscales of the self-regulated learning and volition inventory

scale	subscale	item example	Cronbach's alpha (number of items)
metacognition	planning	“I write a time schedule before I start learning.”	.88 (5)
	self-recording	“I pay attention to not miss my goal when I’m learning.”	.70 (4)
	self-evaluation	“After learning, I check if I’ve reached my goals.”	.76 (5)
cognition	organization	“I draw charts or diagrams in order to structure learning materials.”	.52 (3)
	critical thinking	“I critically question things I learn.”	.70 (3)
motivational beliefs	self-efficacy	“I’m able to find a solution for every problem.”	.77 (5)
	intrinsic motivation	“I enjoy learning.”	.70 (3)
	goal orientation	“I prefer tasks that are interesting, even if they’re difficult to solve.”	.68 (4)
volition	future time perspective	“I even work on difficult and boring tasks, when I know, that they are important for my future.”	.74 (4)
	academic delay of gratification	„I would rather <i>A</i> spend time with friends shortly before an exam or <i>B</i> learn each day for the exam and spend less time with friends.”	.68 (4)
	procrastination	“If something is too difficult to start with, I postpone the task.”	.87 (6)



2.3 Data analysis

In order to test our conception of trait volition and the extended model of trait SRL, we used maximum likelihood parameter estimation with MPlus7 (Muthén & Muthén, 2012). Using confirmatory factor analysis, the factorial structure and the fit of the proposed models were estimated. The model fit is assessed by evaluating the model's χ^2 , its RMSEA (root mean square error of approximation), SRMR (standardized root mean square residual), and CFI (comparative fit index). A good fit is characterized by a non-significant χ^2 ($p > .05$). As this test is less reliable with large sample sizes (Kline, 2005), one can examine the χ^2/df -ratio, which should be below 2:1 to mark an acceptable fit (Schermelleh-Engel, Moosbrugger, & Müller, 2003). RMSEA and SRMR values should be ≤ 0.08 and the CFI as a fit-index has to be > 0.90 to indicate a good fit (Kline, 2005). Besides these model fit estimations, we assessed the criterion validity by analyzing the models' relation to the GPA of university entrance diplomas using structural equation modelling (SEM).

3. Results

3.1 Initial data screening

Table 2 shows the descriptive statistics and the bivariate zero-order correlation matrix of the measured variables. In a first step, the data were screened in order to find outliers and to examine missing data, as well as to assess the linearity and normality of the data. Except for the four participants that were excluded from the analyses because they had missing values on all variables, there were no participants with a lot of missing data or outlier values. For all variables of the SRL questionnaire as well as the volition inventory and the GPA of university entrance diploma Little's MCAR test (Little & Rubin, 2002) indicated that the missing data in this study occurred completely at random ($\chi^2(35) = 29.69, p = .72$). MPlus7 uses the FIML-estimator (full information maximum likelihood) to treat missing values, so we did not impute them. Moreover, the data violated the assumption of a normal distribution why the MLR estimator—which is robust to non-normality—was used to run the analyses.

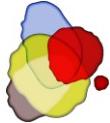


Table 2

Bivariate correlations among variable as well as their means and standard deviations

	1	2	3	4	5	6	7	8	9	10	11	12
1. GPA	-	.16**	-.17**	-.23**	-.08	-.18**	-.22**	-.16**	-.17**	-.15**	-.13*	-.16**
2. procrastination	-		-.74**	-.42**	-.11*	-.29**	-.26**	-.53**	-.49**	-.43**	-.33**	-.22**
3. future time perspective		-		.47**	.09	.26**	.29**	.51**	.54**	.38**	.36**	.25**
4. academic delay of gratification			-		-.10	.28**	.20**	.39**	.30**	.28**	.30**	.13*
5. self-efficacy				-		.26**	.43**	.05	.12*	.01	.06	.17**
6. intrinsic motivation					-		.49**	.10	.20**	.16**	.23**	.35**
7. goal-orientation						-		.18**	.27**	.18**	.21**	.35**
8. planning							-		.50**	.44**	.37**	.12*
9. self-recording								-		.54**	.45**	.42**
10. self-evaluation									-		.23**	.26**
11. organization										-		.28**
12. critical thinking											-	
<i>M</i>	2.10	2.60	2.78	3.01	2.81	3.05	3.05	2.44	2.85	2.60	2.77	2.44
<i>SD</i>	0.60	0.72	0.57	0.63	0.54	0.56	0.51	0.75	0.48	0.57	0.61	0.60

Note. $313 \leq n \leq 377$, * $p < .05$, ** $p < .01$



3.2 Confirmatory factor analysis of trait volition

In order to examine the factor structure of the 14 items of the volition inventory, a latent model of volition with three latent first-order factors (procrastination, academic delay of gratification, future time perspective) and one latent second-order factor (volition) using confirmatory factor analyses was tested. The results speak in favour of a good model fit: $\chi^2(75) = 123.12, p < .01, \chi^2/df = 1.64$, RMSEA = 0.041 [0.028 – 0.054], SRMR = 0.039, CFI = 0.971. Figure 2 shows the model of trait volition with standardized factor loadings that are all significant (all p values $< .001$). The first-order procrastination factor has a negative loading as the procrastination items register the presence of procrastinating behaviour and therefore present a lack of volition.

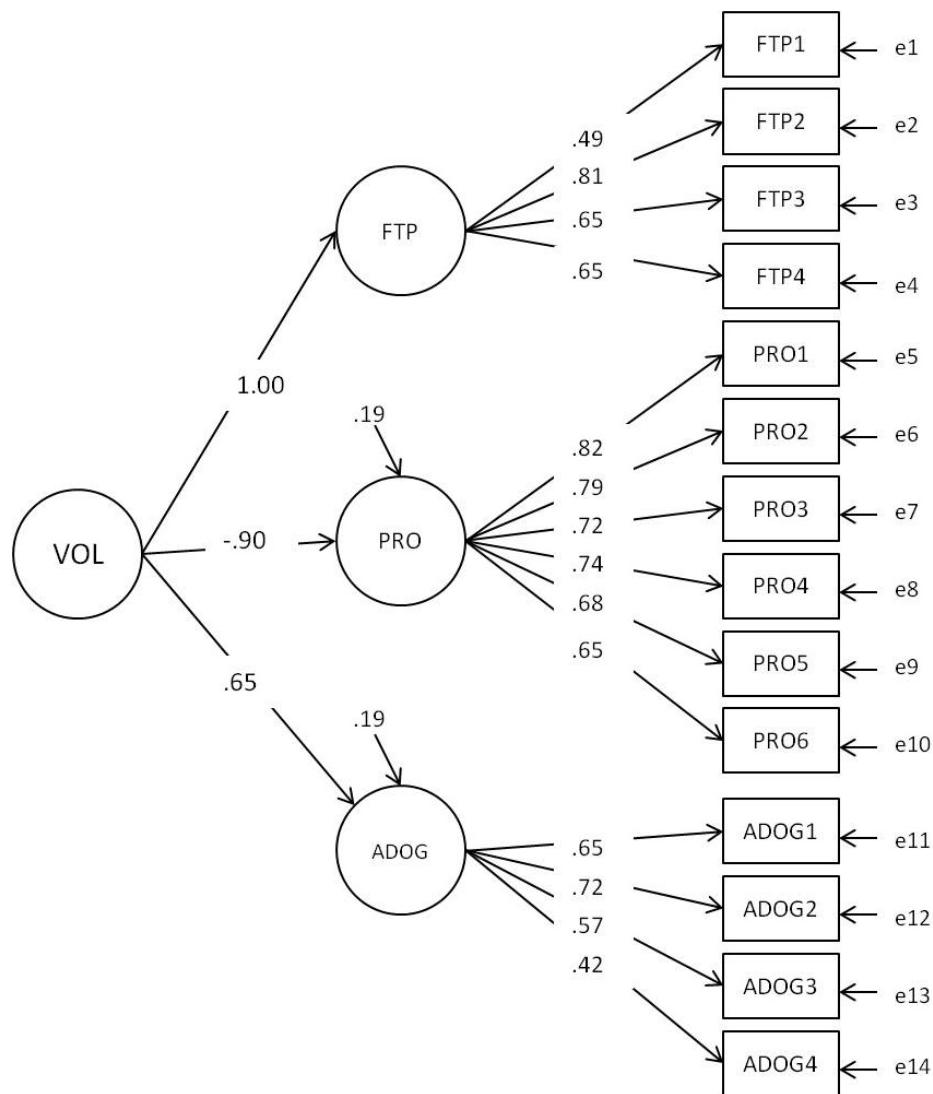


Figure 2. Trait model of volition for SRL with standardized coefficients. VOL volition, FTP future time perspective, PRO procrastination, ADOG academic delay of gratification. All factor loadings are significant ($p < .001$).



3.3 Testing the hypothesized model

In a second step, we tested the comprehensive trait model of SRL by including the volitional factor besides cognitive, metacognitive and motivational belief components into the model of SRL. As the internal consistencies of the SRL inventory show acceptable to satisfying values and the factor structure of the volition inventory was confirmed, the latent factors were estimated by using the respective subscales as observed variables. Because we wanted to examine whether volition—as we conceptualize it—is a fourth factor of SRL (model 1) or is a part of motivation in addition to motivational beliefs (model 2), we compared two models. Table 3 shows the fit-indices of both models, indicating that the model with volition as a subcomponent of motivation fits the data more adequately (model 2). Moreover, as the model alternatives were constructed based on theoretical assumptions, we used the Bayesian information criterion to compare the two models (Burnham & Anderson, 2004). Model 2 has the lower BIC value and therefore seems more appropriate to model the data (Geiser, 2011, see table 3).

Table 3

Fit-indices of the compared SRL-models

model	χ^2	df	χ^2/df	RMSEA	SRMR	CFI	BIC
1	54.13	32	1.69	0.043 [0.022 – 0.062]	0.040	0.980	6287.76
2	45.11	31	1.46	0.035 [0.003 – 0.056]	0.035	0.987	6283.48

3.4 Testing the criterion validity of SRL for achievement

In order to test the relation of our integrative SRL model with academic achievement, we included GPA of the university entrance diploma as a manifest variable into the structural model. Although this measure is not really predictive because it was obtained in the past, we had to take this GPA instead of current GPA of university subject because it is more comparable between students of different subjects of study (Müller-Benedict & Tsarouha, 2011). Additionally, GPA of university entrance diploma is a very central achievement marker in the German education system (Wedler et al., 2008). Moreover, one could argue that SRL as a trait should also have predictive value for past indicators because it should not change that much over time. Both models yield a good fit (model 1: $\chi^2(42) = 70.73, p < .01, \chi^2/df = 1.68$, RMSEA = 0.043 [0.024 – 0.059], SRMR = 0.043, CFI = 0.975, BIC = 6960.42; model 2: $\chi^2(41) = 63.75, p < .01, \chi^2/df = 1.55$, RMSEA = 0.038 [0.018 – 0.056], SRMR = 0.041, CFI = 0.981, BIC = 6958.49) with all significant factor loadings ($p < .001$) and highly significant correlations with GPA (model 1: $r = -0.25, p < .001$; model 2: $r = -0.23, p < .001$). Although the correlation with GPA is slightly higher for model 1, we depict model 2 in figure 3 as it yields better fit indices.

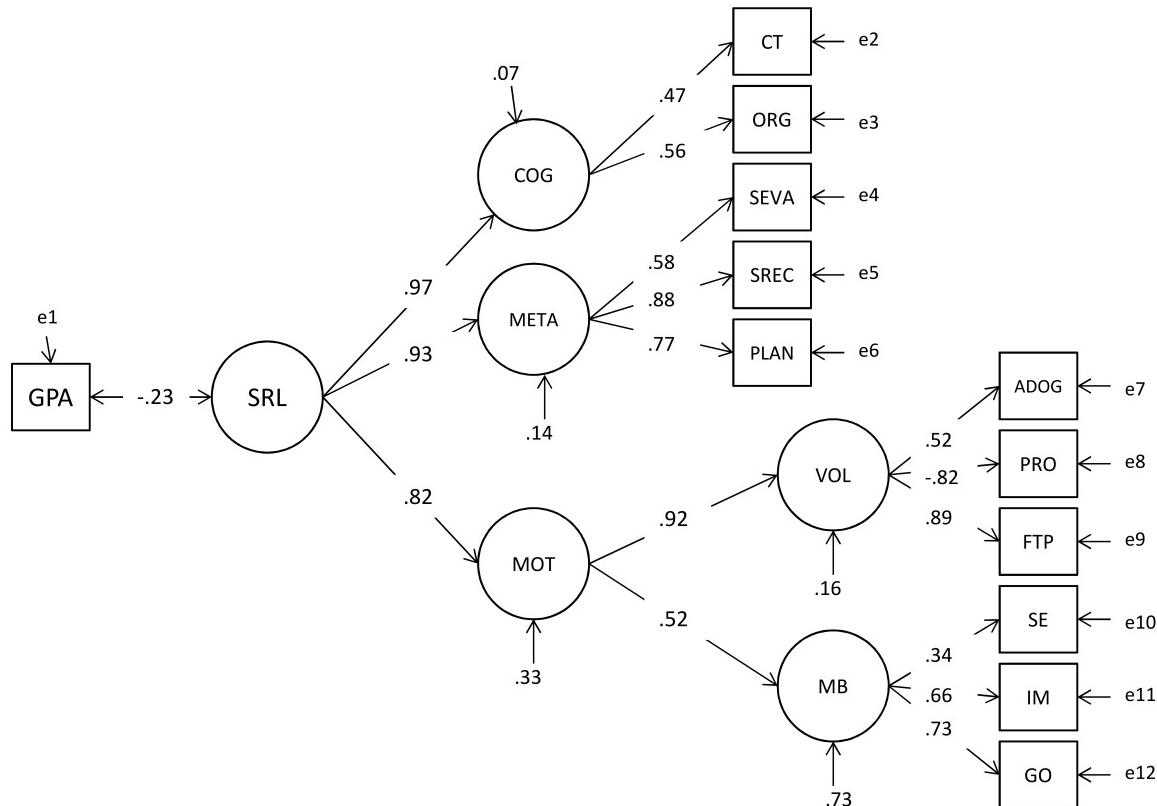
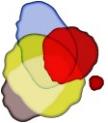


Figure 3. Structural equation model of trait SRL and achievement with standardized coefficients. *GPA* grade point average, *SRL* self-regulated learning, *COG* cognitive components, *CT* critical thinking, *ORG* organization, *META* metacognitive components, *SEVA* self-evaluation, *SREC* self-recording, *PLAN* planning, *MOT* motivational components, *VOL* volition, *ADOG* academic delay of gratification, *PRO* procrastination, *FTP* future time perspective, *MB* motivational beliefs, *SE* self-efficacy, *IM* intrinsic motivation, *GO* goal orientation. All factor loadings are significant ($p < .001$).

4. Discussion

The present study aimed to test a comprehensive trait SRL model that integrates volition besides cognition, metacognition and motivational beliefs. Moreover, a new conception of trait volition for learning was tested empirically. The results confirm the hypothesized structure of volition and speak in favour of a twofold motivational component for SRL that comprises motivational beliefs as well as volition. Furthermore, the trait model of SRL is related to GPA of university entrance diploma emphasizing the importance of SRL for academic achievement.

The first aim of the present study was to examine a new conception of trait volition for learning environments that integrates academic delay of gratification, future time perspective and procrastination. The results suggest that volition within learning environments comprises the competence of postponing available gratification in order to attain important academic goals, and thus is the opposite of delaying an intended action. This motivational regulation is supported by a personal time frame that is directed to the future and focuses on the instrumentality of long-term goals. The present study therefore answers some authors' call for



a systematic investigation of the hypothesized correlational framework (Bembenutty & Karabenick, 2004) and is the first to examine the three constructs concordantly by testing their underlying structure empirically. A shortcoming of the conception is the relatively low factor loading of academic delay of gratification, which could be caused by the items' answer format. As it differs from that of the procrastination and future time perspective items, an adaption to the same measurement format could improve the factor loading. Although the model is not exhausting, it presents an integrative and broad conception that helps to explain and examine trait volition during learning.

The second aim of the study was to test a comprehensive trait model of SRL by extending the Hong and O'Neil model (2001) and by incorporating the new conception of trait volition (e.g. Duckworth et al., 2014; Wolters & Benzon, 2013). Firstly, the modelling results speak in favour of including a cognitive component that comprises the usage of organization as well as elaborative learning strategies. Secondly, results allow for the conclusion that the metacognitive, volitional and motivational belief components should be specified by considering further subcomponents. Thirdly, the findings support the assumption of a comprehensive motivational component that comprises motivational beliefs coinciding with volition. This result clarifies the role of volition as a critical part of goal-oriented behaviour: Optimal motivational beliefs are only valuable if distractions in the course of action can be handled, especially when tasks take several weeks to be completed (Husman et al., 2000). The motivational component of the presented model is therefore in agreement with the differentiation made in action-control theory: The choice of goals during the pre-decisional phase is influenced by self-efficacy, intrinsic value and goal orientation and therefore is named choice motivation. The implementation of planned intentions in the post-decisional phase however is named executive motivation and can only be secured if volition supports motivational beliefs and therefore regulates motivation (Zimmerman, 2011). Hence, our model integrates executive motivation in addition to choice motivation, which has largely been neglected within self-regulated learning research (Garcia et al., 1998). Nevertheless, future studies are needed to test sequential aspects of this model. Longitudinal and experimental investigations could help to clarify predictive relations between motivational beliefs and volitional actions as they should reflect different segments of a goal-oriented process.

Although the model with a twofold motivational component yields a good fit, it is striking that the latent second-order motivational variable is represented strongly by the first-order volitional factor and only moderately by the first-order motivational belief factor. One explanation for this result could be that the relationship between motivational beliefs and volition is not linear, but rather curvilinear in type. Wolters (2003b) has argued that highly motivated students do not need to make use of volitional strategies, whereas totally unmotivated students cannot summon the willingness to enact such strategies. Volition thus could be regarded as mediating the influence of motivational beliefs on the use of SRL strategies (Gaeta, Teruel, & Orejudo, 2012; Garcia et al., 1998) or as supportive for student's motivation in general (Husman et al., 2000). Propositions of action-control theory are in line with the mediator hypothesis: Whereas motivational beliefs are central components of the pre-decisional phase that lead to the choice of a goal, volition refers to post-decisional processes that concern the implementation of intentions (Zimmerman, 2011). Future research could analyse this hypothesis by conducting longitudinal research with a cross-lagged panel design and study the direction of possible effects.

An additional shortcoming of our model is the fact that the motivational belief factor shows a weak factor loading for the self-efficacy indicator. This finding is consistent with the notion of some authors that self-efficacy is rather a motivational precursor than a part of motivation (Usher & Pajares, 2008). Moreover, only one item used in the questionnaire referred to self-efficacy for university context, while four items asked participants to rate their general self-efficacy (Jerusalem & Schwarzer, 1981). As general self-efficacy concerns the handling of global, unspecified problems, it is not necessarily related to academic self-efficacy (Topkaya, 2010). Thus, it would be more adequate to use items that measure academic self-efficacy, or even self-efficacy for self-regulated learning and the use of learning strategies (Schunk & Usher, 2011).

The third aim of the present study was to validate the SRL models by testing their relation to GPA of university entrance diploma. While model 1 showed a slightly higher relation to GPA, model 2 yielded a



better fit. Therefore, we decided to favour the model that integrates volition within the motivational component besides motivational beliefs as this is in accordance with action-control theory. Although the relation with GPA is moderate, it is highly significant and therefore emphasizes the importance of SRL for academic achievement. An explained variance of about 5% is small but comparable to the results of similar studies (e.g. Balkis, Duru, & Bulus, 2013). The inclusion of interindividual variables, such as intelligence, personality, or attitudes could increase the prediction of GPA. Taken together, the results of the present study underline the importance of volition within SRL frameworks and confirm the construct's relevance for academic achievement, especially because students with high values on the examined SRL traits show better academic performance.

4.1 Limitations

Although the data speak in favour of integrating volition within a broader trait SRL framework, several methodological limitations are present that should be considered when interpreting the results: The achievement marker used in the present study is not optimal as it is retrospective. We chose the criterion of GPA of university entrance diploma since it is very central in the German educational system: It is the result of national exams that are curricular-based and thus comparable across different schools and regions. All university students pass this exam in the same class level ensuring a comparable educational level. Moreover, it is used for applicant selection at many universities and has a strong relationship with later university achievement (Wedler et al., 2008). Therefore, it is comparable between students of all subjects of study. Although the analysis corresponds to some kind of retrodiction, it is justifiable because we regard SRL as a stable trait that should be related to past indicators. Future studies could analyse the predictive validity of the integrative SRL model for current GPA of subject of study. In order to obtain reliable results, students should be from the same field of study because grades of different subjects are not comparable in the German college system (Müller-Benedict & Tsarouha, 2011). Moreover, they should be in the same phase of their studies in order to obtain comparable experiences with university exams. Additionally, future studies should aim at using objective achievement markers stemming from performance tests to validate models like the one proposed in this study.

Another limitation is the heterogeneity of the sample used: Participants studied a wide range of subjects and were in different phases of their studies. This reduces the interindividual comparability concerning study experiences and interest structures. Nevertheless, the obtained results using such a heterogeneous sample speak in favour of SRL as an important factor for all fields of study. Moreover, the sample was highly selective, as college students have the highest school degree available in Germany and thus represent the upper ability continuum. Future studies should validate SRL models on a sample that is more representative for the diversity of our society and the lifelong learners living in it. Additionally, the participants were predominantly female. As previous studies have shown, males report higher self-efficacy values (Huang, 2013) and show higher values concerning the use of elaborative learning strategies (Bembenutty, 2007). Nevertheless, females report higher academic delay of gratification (Bembenutty, 2007). An exploratory multivariate analysis of variance using the SRL and volition subscales as dependent variables and gender as independent variable indicated an effect of gender as females in our study reported significant higher academic delay of gratification and significant lower self-efficacy beliefs than males. Consequently, structural analyses could be conducted for both genders separately to investigate if factor structures differentiate between the groups.

As mentioned previously, the different answer formats of the instruments used as well as the low reliability for the subscale of organizational learning strategies represent further limitations. Future examinations should aim to adjust the instruments concerning their structure in order to make them more comparable and should choose more reliable items to depict organizational learning strategies.

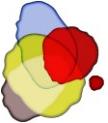


4.2 Implications and future directions

The presented findings have several implications for educational researchers: As the results speak in favour of the integration of academic delay of gratification, future time perspective, and procrastination to conceptualize volition for learning, future research could cross-validate this conception with samples of different age and educational groups. In addition, the findings support the trait SRL model with an expanded motivational component that integrates motivational beliefs and volition. This is why future research should include volitional factors into the theoretical research basis along with other motivational constructs. Moreover, analyses of the model's relationship with several variables of interest, such as intelligence, personality traits, or attitudes could result in further important insights. Latent profile analyses could support the investigation of the relation between interpersonal differences and the trait model of SRL and could help to identify types of learners that need different types of interventions. Moreover, it would be interesting to examine the model's stability by conducting longitudinal research as stability measurements would militate in favour of the trait concept of SRL. Questionnaire methods are indispensable for measuring traits because participants have to aggregate their behaviour concerning several situations, which is in accordance with the situation-independent trait perspective. Nevertheless, future research could complement self-report scales with qualitative instruments, such as interviews or thinking aloud protocols (Veenman, 2011), representing a multimethod approach. Subsequently, with regard to the analysis of trait SRL, future studies could transfer the model to state level and examine its structure using process measures. As trait and state SRL are highly interrelated (Hong, 1998), it would be interesting to systematically analyse whether the components of our model are present in all phases of SRL using process models as a theoretical basis (e.g. Zimmerman, 2000). Moreover, state analyses could focus the question which strategies are used to ensure volitional control. Altogether, it seems appropriate to assume that cognitive and metacognitive variables as well as motivational beliefs and volition are important for planning, performing, and reflecting upon one's learning. Nevertheless, more research is needed to derive practical implications based on these theoretical findings. Longitudinal studies that investigate the stability of the constructs, their reciprocal relations as well as their development and interconnection in earlier stages of life could be helpful.

Keypoints

- Academic delay of gratification, procrastination and future time perspective can be integrated in order to depict volition for SRL.
- An SRL trait model that comprises cognitive, metacognitive and motivational components yields a good fit. Volition for learning can be integrated within that model by extending the motivational component and adding volition above and beyond motivational beliefs.
- The proposed SRL trait model is related to GPA which is a first hint of its validity.

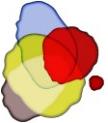


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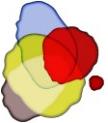
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